

4.1 + 4.2 factoring

Rational Expressions \rightarrow denominator can't equal zero

$$\frac{5}{x}$$

$x \neq 0$

$$\frac{x+1}{x^2}$$

$$\frac{x+3}{2-x}$$

$$2-x \neq 0$$

$$x \neq 2$$

$$2 \neq x$$

$$2 \neq x$$

p. 52

\rightarrow restrictions, non-permissible values

3.

a)

$$\frac{3}{x}$$

$$x \neq 0$$

x is
undefined
at 0

b)

$$\frac{x+2}{x-1}$$

$$x \neq 1$$

$$c) \frac{x-1}{x^2+1}$$

$$x^2+1 \neq 0$$

no restrictions

$$x^2 \neq -1$$

$$e) \frac{x^2-x-6}{x^2-4x}$$

$$\underline{x^2-4x}$$

\rightarrow

$$\underline{x}(x-4)$$

$$x \neq 0, 4$$

$$j) \frac{x^2-4}{x^4-1}$$

$$(x^4-1) \rightarrow (x^2+1)(x^2-1) \rightarrow (x^2+1)(x+1)(x-1)$$

$$x \neq \pm 1$$

$$x^4-1 \neq 0$$

$$x^4 \neq 1$$

$$x \neq \pm \sqrt[4]{1} \neq \pm 1$$

$$i) \frac{x-y}{x^2-2xy+y^2}$$

$$(x-y)(x-y) \quad x-y \neq 0 \quad x \neq y$$

$$(x-y)^2$$

$$h) \frac{\text{wavy line}}{(x^2-y^2)} \rightarrow (x+2)(x-2) \quad x \neq \pm 2$$

$$(x+y)(x-y)$$

$$x \neq \pm y$$

$$2. \quad c) \frac{65}{78} = \frac{(5)(13)}{(6)(13)}$$

$$\frac{(x+1)(x+2)}{(x+3)(x+2)}$$

p. 53

$$4. \quad a) \frac{x-1}{x-1} = 1 \quad c) \frac{x+1}{1+x} = 1$$

$$\frac{a-b}{b-a} = \frac{a-b}{-1(-b+a)} = \frac{a-b}{-(a-b)} = -1$$

$$5. f) \frac{2x^2 - 8x}{4 - x} = \frac{2x(x-4)^{-1}}{4-x} = -2x$$

$$s) \frac{(x+3y)(x-y)}{x^2 + 2xy - 3y^2} = \frac{x+3y}{2x+y}$$

$$\frac{2x^2 - xy - y^2}{(2x+y)(x-y)}$$

-2

$$w) \frac{x(x+2) + 2(y-3)}{xy - 3x + 2y - 6} = \frac{y-3}{y+5}$$

$$\frac{x(y-3) + 2(y-3)}{xy - 3x + 2y - 6}$$

$$\frac{x(y+5) + 2(y+5)}{(y+5)(x+2)}$$

$$n) \frac{(x-6)(5x-2)}{(4x-3)(x-6)} = \frac{5x-2}{4x-3}$$

$$v) \frac{-(2x^2 - x - 15)}{x^2 - 10x + 21} = -\frac{(2x+5)(x-3)}{(x-7)(x-3)}$$

$$= -\frac{2x+5}{x-7}$$

$$u) \frac{+(2x^2 + x - 6)}{+(10x^2 - 7x - 12)} = \frac{(2x-3)(x+2)}{(2x-3)(5x+4)}$$

$$= \frac{x+2}{5x+4}$$

Multiplying

$$\frac{c}{b} \cdot \frac{a}{d} = \frac{ac}{bd} \quad \begin{matrix} b \neq 0 \\ d \neq 0 \end{matrix}$$

p. 60

$$2. \quad i) \frac{3(x^2-4)}{28(x-2)} \cdot \frac{14x}{11(x+2)}$$

$$\frac{3(\cancel{x-2})(\cancel{x+2})}{2 \cdot 28(\cancel{x-2})} \cdot \frac{\cancel{14}x}{11(\cancel{x+2})} = \frac{3x}{22}$$

$$u) \frac{2y^2 + 11y + 5}{2y^2 + 7y + 3} \cdot \frac{y^2 - 9}{y^2 - 3y}$$

$$\frac{(\cancel{2y+1})(y+5)}{(\cancel{2y+1})(\cancel{y+3})} \cdot \frac{(\cancel{y+3})(\cancel{y-3})}{y(\cancel{y-3})}$$

$$= \frac{y+5}{y}$$

Dividing $\frac{a}{\textcircled{b}} \div \frac{c}{\textcircled{d}} = \frac{a}{b} \cdot \frac{d}{\textcircled{c}} = \frac{ad}{bc}$

$$b \neq 0$$

$$c \neq 0$$

$$d \neq 0$$

p. 62

$$3. m) \frac{4y - 4x}{8y^3} \div \frac{x^2 - y^2}{2x + 2y}$$

$$\frac{\cancel{4}(y-x)}{\cancel{8}y^3} \cdot \frac{\cancel{2}(x+y)}{(\cancel{x+y})(\cancel{x-y})} = \frac{-1}{y^3}$$

$$\frac{a-b}{b-a} = -1$$

$$t) \quad \frac{x-8}{x-4} \div \left(\frac{\frac{(x-4)(x-8)}{x^2-12x+32}}{8x} \cdot \frac{x(x-8)}{x^2-8x+16} \right)$$

$(x-4)(x-4)$

$$\frac{\cancel{x-8}}{\cancel{x-4}} \cdot \frac{8x(\cancel{x-4})}{\cancel{x}(x-8)(x-8)} = \frac{8}{x-8}$$

practice: 60-62